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PARTICULATE MATTER

WHAT IS PARTICULATE MATTER?

Particulate matter (PM) is the general term used for a mixture of solid particles such as dust, ash and smoke, and liquid droplets (other than water) found in the air. Particulate matter can be emitted directly from a source, such as construction sites, unpaved roads, fields, smokestacks or fires, or can form in the atmosphere from chemicals, such as sulfur dioxides and nitrogen oxides that are emitted from power plants, industries, homes and automobiles. Some particles are large enough to be seen as dust or dirt. Others are so small they can be detected only with an electron microscope.

Smaller particles are of more concern, $PM_{2.5}$ describes the "fine" particles that are less than or equal to 2.5 micrometers (µm) in diameter. Coarse particles are greater than 2.5 µm, but less than or equal to 10 µm in diameter. PM_{10} refers to all particles less than or equal to 10 µm in diameter. A particle 10 µm in diameter is about one-seventh the diameter of a human hair. Both PM_{10} and $PM_{2.5}$ are measured and regulated with ambient air quality standards.

WHERE DOES FINE PARTICULATE MATTER COME FROM?

Emission Sources	
• Home heating oil combustion	• Power plants
• Wood combustion	• Industrial processes
• Industrial boilers	• Cars
• Diesel engines	• Lawnmowers and other small engines
	• Other combustion sources

WHAT ARE THE HUMAN HEALTH AND ENVIRONMENTAL EFFECTS?

Particles of concern can include both fine and coarse particles, although fine particles have been more clearly linked to the most serious health effects. People with heart or lung disease, the elderly and children are at highest risk from exposure to particles.

Health Effects	Environmental Effects
• Premature death	• Harms vegetation and ecosystems (e.g. sedimentation)
• Respiratory related hospital admissions and emergency room visits	• Contributes to the formation of acid rain (e.g. making soils, lakes and streams more acidic)
• Aggravated asthma	• Erodes and stains monuments and statues.
• Coughing and difficulty or pain breathing	• Damages paints and building materials
• Chronic bronchitis	• Damages sensitive forests and farm crops
• Decrease lung function	
• Cancer	
• Work and school absences	

- New Jersey has put added emphasis on controlling emissions from diesel engines due to the severe adverse health effects associated with exposure to the components of diesel particles, including carcinogenicity. The United States Environmental Protection Agency (USEPA) has identified diesel exhaust as a probable human carcinogen.

- In addition to health problems, particulate matter is the major cause of reduced visibility in many parts of the United States. New Jersey is home to a federally protected Class I area in the Brigantine Wilderness Area of the Edwin B. Forsythe National Wildlife Refuge, which is subject to federal regional haze regulations that require increased visibility to protect the scenic vista from this area.

- Particulates frequently contain air toxics, including heavy metals and polycyclic organic matter, some of which cause cancer.

WHAT ARE THE MONITORING TRENDS IN NEW JERSEY?

Over the years, air quality in New Jersey has been improving. New, more stringent federal health-based standards for fine particulates, which were promulgated in 1997, require states to do more to protect human health. New Jersey's air monitoring program evaluates hourly air quality readings using the national methodology called the Air Quality Index (AQI). The AQI uses five of the six pollutants for which there are national health-based standards (ground-level ozone, particulates, carbon monoxide, nitrogen dioxide and sulfur dioxide) and compares the composite pollutant levels to the federal standards in order to assign an air quality rating such as "good" or "unhealthy."

Based on the AQI scale and applying the new ozone standard, New Jersey had 8 days of unhealthy levels of fine-particle pollution in 2003, 5 days in 2004, and 7 days in 2005. If EPA's proposed more stringent standards were in place the number of unhealthy days would be higher.

WHAT IS BEING DONE ABOUT PARTICULATE MATTER?

- Under the federal Clean Air Act, the USEPA has set health-based standards for particulate matter in the air we breathe. The USEPA and state and local governments have instituted a variety of multi-faceted regulatory programs to meet these health-based standards.

  - More stringent health based standards were proposed in 2005.

  - On September 7, 2005, a law was signed in New Jersey that will establish a program to cut exposure to harmful diesel emissions in school buses and to reduce diesel soot from garbage trucks, transit buses and publicly owned on-road and off-road diesel vehicles and equipment.

  - Throughout the country, additional programs are being put into place to cut particulate emissions from diesel-powered vehicles, industrial facilities and electric utilities. This includes the Clean Air Nonroad Diesel Rule, the ultra-low sulfur diesel fuel requirement, vehicle inspection & maintenance (I/M) programs, and advanced pollution control technology mandates for some utilities.

  - Non-regulatory programs also encourage communities to adopt practices such as carpooling to reduce harmful emissions.

- Even though there are multiple initiatives already in place to reduce particulate emissions, we need to develop new and innovative ways to reduce fine-particle pollution in order to improve air quality in New Jersey. This should include regional and national efforts, such as particulate reductions from coal-fired power plants.